Muon reconstruction in ORCA 7: status and perspective

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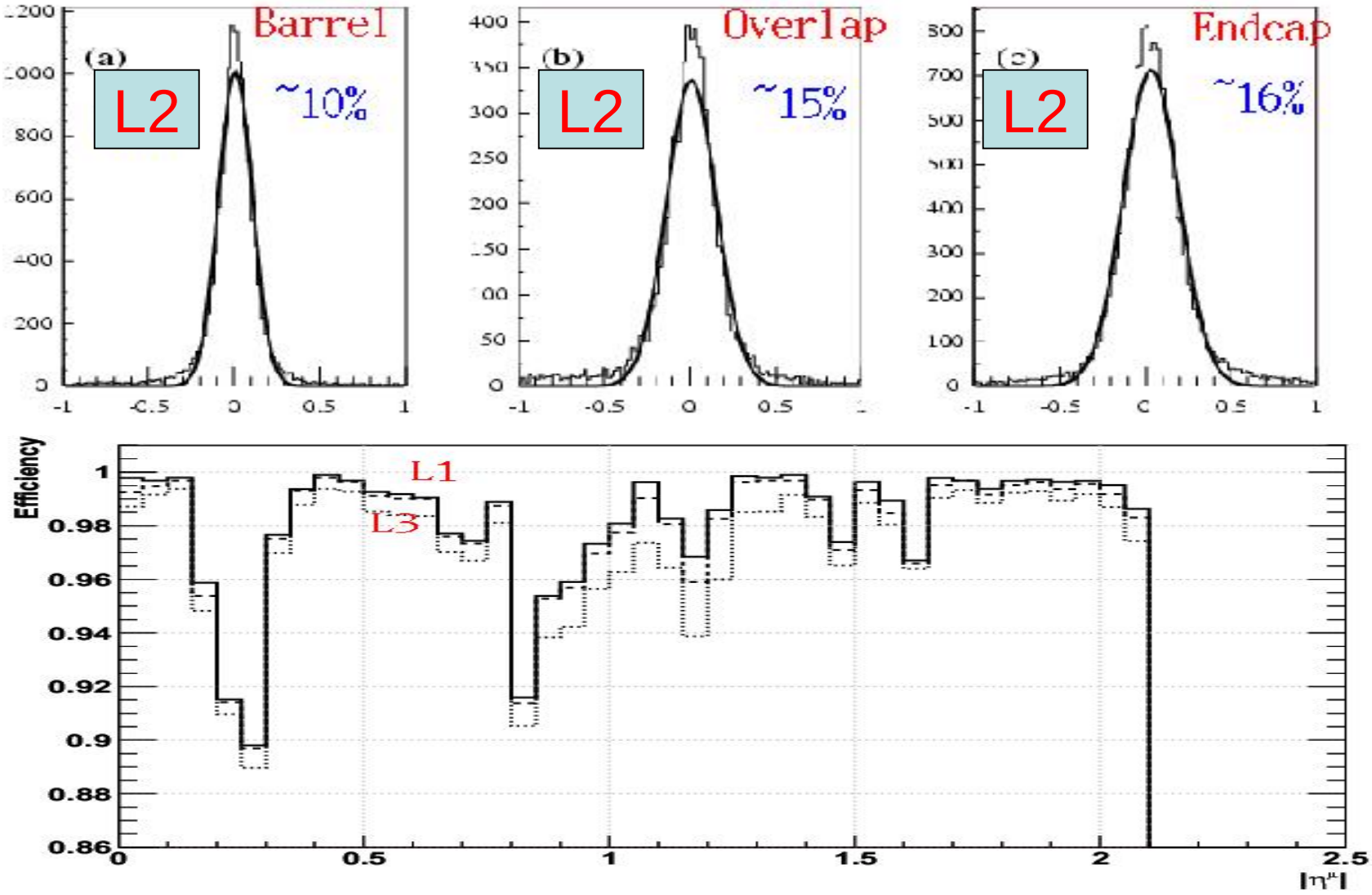
Short status at the DAQ TDR pt resolution and efficiency:



What's next?

- Efficiency and resolution are OK
- Performance for CPU time still not optimized:
- Current CPU time ~700 ms (on PIII 1GHz)
- Most of the time spent in propagating states using GEANE
- Plan to substitute it with full customizable and optimized propagator
- Medium-long timescale: summer
- See Nicola's talk for more info

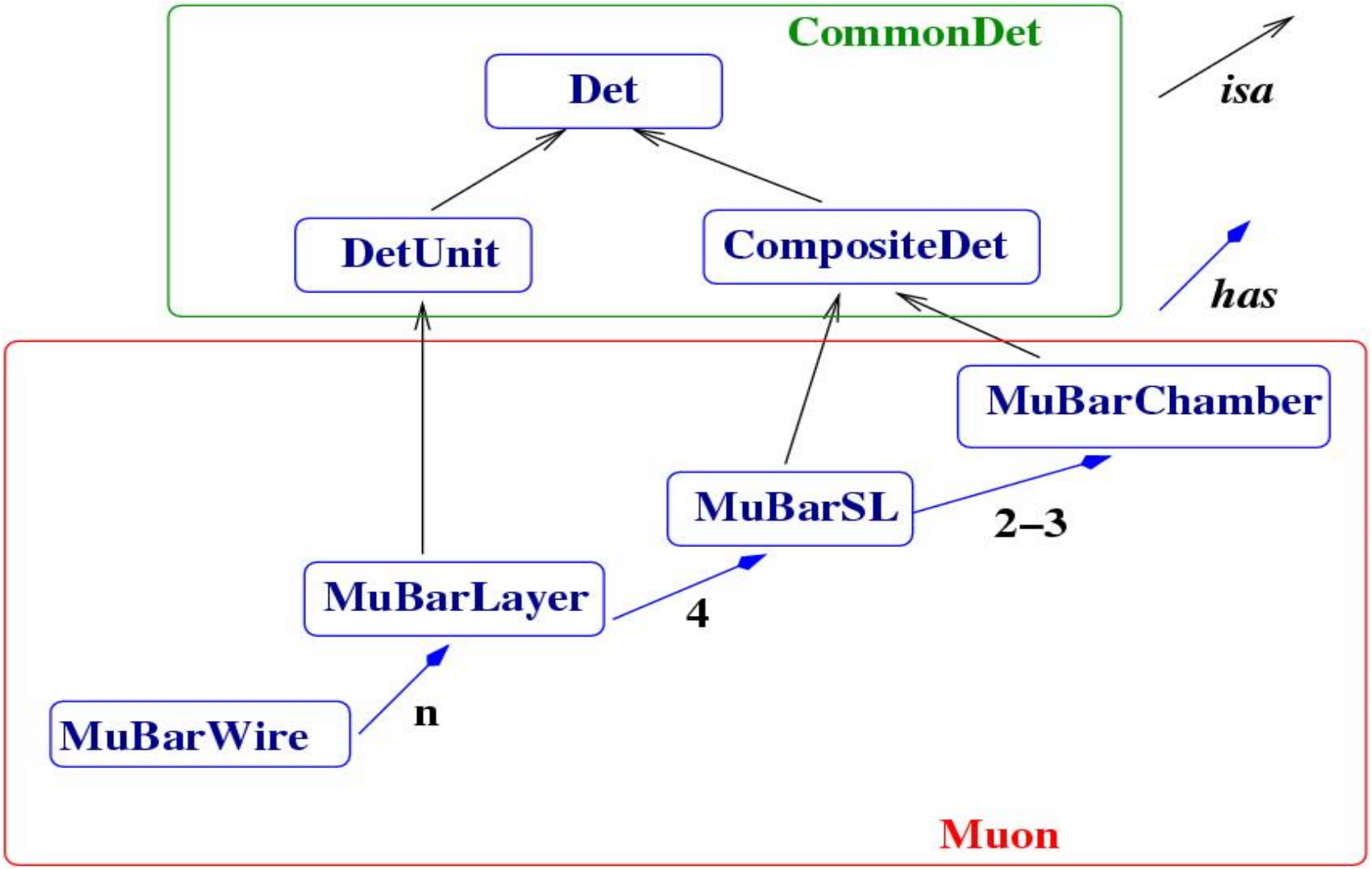
Geometry interface

- Related with previous work, need to define proper geometry for (At least) 3 purposes:
- Reconstruction
- Magnetic field description
- Passive material description
- Optimization are different for the 3 task
- Common source of geometry information, and common interface needed
- DDD (Detector Description Database) was build for this
- Information stored in xml files with C++ interface inside COBRA/ORCA/OSCAR/… framework

ORCA migration to DDD

- Simply a transition from TZ to XML for CSC and RPC
- For DT, complete rewriting and re-architecture of the ORCA geometry framework
- Full use of CommonDet interfaces and functionality
- Unified access to position, rotation, frame transformation,
- Use Det interface also to DTLayers and DT SuperLayers, not only DT Chambers
- Status: code committed to CVS and fully tested, documentation in progress
- Will allow much easier construction of TestBeam geometry, reusing lot of the code used to build the full CMS

New DT geometry architecture



New interface to DT geometry

- Two possible navigation pattern: via **CommonDet** interface or via **MBDetector** interface,
- The former used when accessing objects as Dets, as in global reconstruction,
- The latter used to access objects as MuBarObjects, to use the specific MB interface, e.g. to get MuBarSegments (as such and not as RecHits) or to get number of wire in a DT Layers or similar...,

RecHits:

- So far the only **RecHits** available are the MuBarSegment, which are bounded to the MuBarChamber;
- Also **MuBarRecHit** (namely the hits at layer level) are built, but only those associated to segments are today accessible;
- With new architecture the hits will be attached to the MuBarLayer and accessible as **MuBarRecHitPair** (L/R ambiguity); *in progress*
- Will be also possible to build segments inside each SL separately, very useful for alignment and TB efficiency studies (*foreseen*);

DT neutron background

- So far not implemented in ORCA (just in cmsim),
- DAQ TDR results produced without neutron hits,
- In December CMS week presented (by R. Wilkinson) a common Muon framework to introduce hits in digitization,
- based on a “PU like” database of neutron hits, to be populated off-line and randomly added,
- code ready: DTs should populate their DB,
- Retrieving from DB and dispatching is responsibility of COBRA (as for PU events): agreed but functionality not currently available.

Muon misalignement

- Framework present in ORCA to simulate the mis-alignment of detectors,
- Implemented for Muon system by Francisco M., Celso M and co. (presented in december CMS week),
- Several type of movement available: B-on, gravity, wheel rotation, etc…
- With new DT architecture will be possible to move also SLs and Layers inside chambers,
- Currently committed to CVS, will go in next ORCA 730,
- Big problem is where to put (and get) the mis-alignment parameters: not DDD, but condition DB, which does not exist yet.

DT digitization

- Currently based on old 4 cm wide cell, stretched to 4.2 cm,
- Work in progress for new cell simulation (previous talk),
- Must understand what exactly the DAQ will provide in CMS,
- Strictly drift time? TOF subtracted? “Absolute” CMS time?
- How to simulate the effect of uncorrect bx assignment by GMT in the reconstruction?
- Origin of recent traffic on prs-mu mailing list…

Summary

- Improve CPU time performance
- Improve code quality and user friend-ness
- Done: re-architecturing of DT geometry,
- Building of geometry from DDD
- Mis-alignment tool in place
- DT digitization in progress
- As usual a lot of work still to be done!!